LKE MNCUBE

59448873

Unique Assignment Number: 789872

# Question 1

## a)

Substitute back into above equations

System of equations:

## b)

Solve using Gaussian Elimination

Augmented matrix

*R2 - 4R1 R2*

*R3 - 7R1 R3*

- *R2 R2*

*R1 – 4R2 R1*

*– 6R2+R3 R3*

Let

Substitute

Solution:

## c)

Solve lower triangular system

Augmented matrix

From the above:

Substitute

Substitute ,

Substitute , ,

Solution:

## d)

Solve the system:

*R1 R1*

*R2 – 7R1 R2*

*R3 – 4R1 R3*

*R2 R1*

*R1*-  *R2 R1*

*R2 – R3 R3*

Let

+

+

# Question 2

## a)

Solve for C such that

Augmented matrix

*R1- R3 R1*

*R1- R3 R3*

*R1+R3 R1*

*R2+2R3 R2*

*R2+R3 R3*

*R3 R3*

*R215R3 R2*

*R14R3 R2*

*C would need to be 23 in order to make x,y and z be integers.*

## b)

Augmented matrix

Eliminate into Generalized row-echelon form

*R2- R1 R2*

*R3- R1 R3*

Corresponding system

## i)

The system has exactly one solution where the matrix is in reduced row-echelon form.

One/Unique solution exists where AND

One/Unique solution exists where AND

## ii)

No solution exists where in the last row we have , where (0,0,0,C)

No solution exists where AND .

Change last equation into the form , where

Hence no solution exists if .

## iii)

Infinitely many solutions exists where in the last row we have , where (0,0,0,0)

infinitely many solutions exist where AND 2 =0

Hence no solution exists if Although, , so the case where we have infinitely many solutions does not exist for this system.

## c)

Where:

## i)

## ii)

Let matrix B be defined as:

Assume that , , and

Also assume that , , and

So replace the first, second or third column respectively in matrix B with the vectors , , respectively.

# Question 3

## a)

## b)

***absolute value norm***

=

## c)

Distance between

And

Therefore the distance between

## d)

Calculate :

=

=

=

## e)

The area of the parallelogram bounded by and :

Area =

= (0×0– 4x4) - (1×0-4×2) + (1x4-0x2)

=-(16) – (8)+ (4)

=(-16,-8,4)

Area =

## f)

The equation of the plane parallel to and and passing through the tip of

**From 3(e) above,**  (-16,-8,4)

As an equation**:** )

Let be an arbitrary point on the plane

)

is parallel to the plane and perpendicular to the cross product

). (-16,-8,4) = 0

= 0

= 12

# Question 4

Let and

and are in the form

and are complex numbers

Polar form of a complex number is:

## i)

Where a > 0,

Polar form: .

## ii)

Where a > 0,

Polar form:

## iii)

Show that

But both and are complex numbers in the form

.

Simplify, let :

.

.

but

***Pythagorean identity:***

Where

## iv)

Determine the modulus of

But both and are complex numbers in the form

modulus of

modulus of

, where ***Property of conjugate***

## (b)

Use the Moivre’s theorem to derive a formula for the 4th roots of 8.

***DeMoivre's formula***

where

That is:

.

.

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